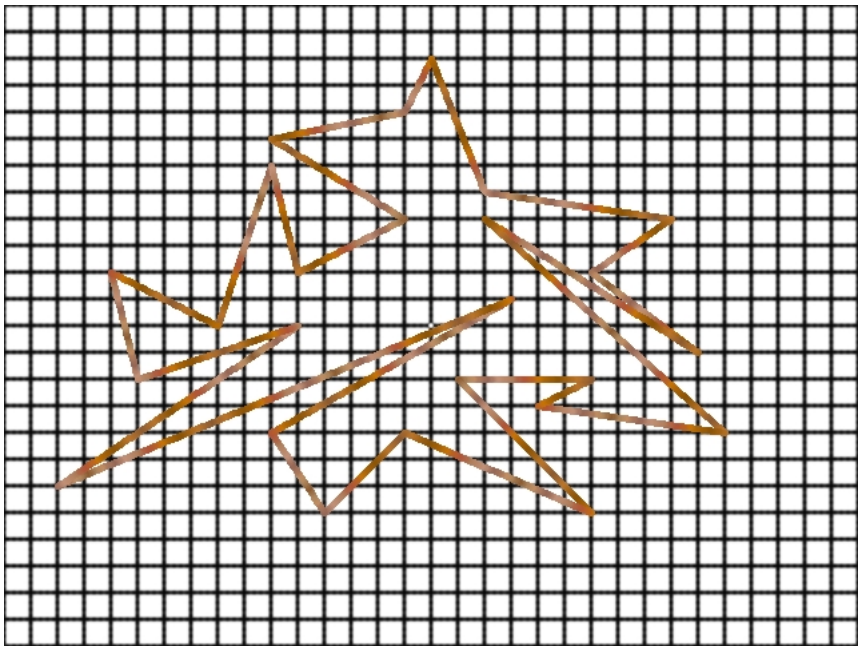
## TOPIC FOR AFTER THANKSGIVING BREAK

PICK'S THEOREM

*Pick's Theorem* is a geometric statement about certain types of polygons in two dimensions. Informally, a *polygon* is a shape like the one pictured below. The edges of the shape are line segments, and together all the segments enclose an area. A polygon is called *simple* if the boundary of the polygon does not cross itself. A polygon is called a *lattice* polygon if the vertices of the polygon have integer coordinates in the $x, y$-plane. Pick's Theorem is a statement about the *area* of simple lattice polygons. A *lattice point* in the $x, y$-plane is a point $(x, y)$ where $x$



and $y$ are integers. A lattice point $(x, y)$ is called an *interior lattice point* with respect to a polygon if $(x, y)$ lies inside that polygon. A lattice point $(x, y)$ is called a *boundary lattice point* with respect to a polygon if $(x, y)$ lies on the boundary of the polygon.

Pick's Theorem states that for simple lattice polygons, the area is a simple function of the number of interior and boundary lattice points. Moreover, Pick's Theorem explicitly gives us a formula for this area in terms of these numbers. Using Pick's Theorem we can easily compute the area of the above polygon without any geometry. All we have to do is count! On Wednesday we will discuss what Pick's Theorem says, learn how to use it, and talk a little bit about the proof.